Amendments to Specification

Add the following paragraph after the Title on the first page:

This application is a continuation of U.S. Patent Application Serial No. 10/313,580 filed on December 9, 2002, which is a continuation in part of U.S. Patent Application Serial No. 09/677,749 filed on October 3, 2000.

Amend the first paragraph on page 1 as follows:

This invention relates to non-rotary wing vertical and short take-off and landing (V/STOL) passenger aircraft. Class 244/12.3 appears to be the most appropriate. More particularly, the present invention relates to a V/STOL aircraft in which the rotor plane of a single ducted fan is located horizontally inside the center of a conventional aircraft wing to provide vertical lift, with a fan diameter much greater than the fuselage width of said aircraft. An additional tractor or pusher propeller provides horizontal thrust for forward movement in the conventional manner, and is located above the rear part of the ducted fan. The aircraft utilizes two main wings in a negative staggered biplane arrangement, with an oversized stabilizer and elevator, and a canard mounted at the front of said aircraft. The ducted fan is mounted inside the top wing.

Amend the first paragraph on page 8 as follows:

Another advantage is the preferred embodiment can be used as amphibious aircraft. The conventional tractor or pusher propeller location is above the jyrodyne in a position often used in amphibious aircraft. This allows conversion of the jyrodyne to amphibious service with only the installation of pontoons outboard of the exbedded duct, in a manner well known to those skilled in the art.

Amend the seventh paragraph on page 8 as follows:

Another advantage applies during the short transition from VTOL to conventional flight. The location of the tractor or pusher propeller above the rear of the ducted fan shroud inlet bellmouth

provides a strong compensating effect against the pitching up tendency of ducted fans when moving forward.

Amend the second paragraph on page 9 as follows:

Another common assumption, evidenced in Figure 4 of patent # 5,152,478, is to increase the radius of the inlet bellmouth, but it has been assumed in that patent that beyond 0.04-0.06 lip radius/duct diameter little extra lift is obtained. The longer lip radius of the bellmouth on the inlet lip of the ducted fan shroud of the jyrodyne extends to as much as 30% of the duct diameter. Desirably, the ducted fan shroud bellmouth has a radius of from 0.1 to 0.3 times the ducted fan diameter. This is done for two reasons: 1) to increase the Figure of Merit to ~0.9 as shown in the other line shown said Figure 4, and 2) to capture more of the suction lift at the periphery of the bellmouth inlet.

Amend the description of Figure 18 on page 11 as follows:

Figure 18 illustrates the new pilot control arrangements used in the jyrodyne to control the transitional use of the ducted fan rotor and tractor or pusher propeller

Amend the description of the first paragraph of page 14 as follows:

Forward movement of the jyrodyne in conventional flight mode, utilizes the conventional tractor or pusher prop, which produces a thrust vector noted as arrow **11** in Figure **3.**

Amend the description of the first paragraph of page 16 as follows:

Referring to **Figure 7**, the internal part of the rear section contains the engines, **16**, tailwheel, **17**, and the central fin, **18**, rudder, **19**, the tractor or pusher prop, **20**, and its associated drivetrain, **21**, used for forward flight. The front of the rear section provides attachment points for the drivetrain truss, **22**. The rear section of the fuselage transitions from a rounded cross section at its front to a tapered circular cross section at the rear of the rear section.

Amend the description of the first paragraph of page 26 as follows:

The central third of the elevator located on the horizontal stabilizer of the "T" tail which lies in the slipstream of the tractor <u>or pusher</u> propeller, operates separately from the two outboard sections, as may be seen in **Figure 14**. The central section is denoted by **3**, and the two outboard sections as **1** and **2.** This is due to the need to compensate for changes in the thrust moment arm of said tractor <u>or pusher</u> propeller when the engine throttle position is changed. For instance, without this feature, quick closing of the throttle at the end of a takeoff run reduces the forward thrust of said tractor <u>or pusher</u> propeller. Since said forward thrust acts through a long moment arm whose thrust vector is above the jyrodyne center of gravity during full throttle takeoffs, said forward thrust of the high-mounted tractor <u>or pusher</u> propeller tends to press the nosegear of the jyrodyne on the ground. When the throttle is suddenly closed, the moment arm effect pressing the nosegear down is reduced to the point that the jyrodyne will pitch up at just below takeoff speed, lift into the air and stall. This happened several times to radio-controlled models of the jyrodyne, resulting in minor damage to the models in subsequent hard landings. By linking the central third of the elevator to the throttle, the elevator can respond instantly to changes in throttle position and prevent the stall. The prop wash from the prop enhances the effectiveness of this central third of the elevator.

Amend the description of the last paragraph of page 26 as follows:

In the preferred embodiment, yaw stability requirements for the jyrodyne have been found during taxi and low speed flight testing to be substantially higher than for a conventional aircraft, since the rearward location of the tractor <u>or pusher</u> propeller produces thrust much further aft than in a conventional aircraft. The vertical tail plane area as a percentage of the wing area requirement for the jyrodyne is 40%, roughly 3 times larger than the tailplane area requirement for conventional aircraft. Furthermore, the jyrodyne operates at much slower speeds than conventional aircraft, and thus requires larger control surfaces to compensate for the lower

dynamic energy of the air passing over the surfaces. Another sizing criterion for the jyrodyne is to fit into a conventional 40 foot wide "T" hangar as is seen at most airports. Thus, the jyrodyne overall wingspan is limited to less than 40 feet, and length and height are limited to values of 32' and 13', respectively. The location of the exbedded ducted fan limits ~~is~~ the overall length to a short ~~of the~~ rear fuselage, and to get the necessary tail volume for the aircraft the vertical fins need to be large. For these reasons, the size of the vertical fins for the jyrodyne are substantially larger than such other similar twin finned aircraft such as the Lockheed P-38, Cessna Skymaster or Rutan Long-Ez, whose tailplane/wing area ratio requirements are around 13-15%.

Amend the description of the last paragraph of page 31 as follows:

Takeoff transitional flight begins with the jyrodyne tilting the plane of the ducted fan rotor forward. In the preferred embodiment, this converts about 7% of the rotor thrust vector to forward flight and causes the jyrodyne to accelerate. As it accelerates, lift at the front of the ducted fan shroud increases due to the increased velocity, while lift is reduced at the rear entrance to the ducted fan, due to the air being sucked into the fan against the forward movement of the jyrodyne. This is the pitch up phenomena described earlier as extra front quadrant lift, and reduced rear quadrant lift. When engine power is applied to the tractor or pusher propeller, the high thrust line over the jyrodyne center of gravity forces the nose down, and helps the aerodynamic controls working to minimize the pitching up effect.

Amend the description of the first paragraph of page 32 as follows:

However, another nose down effect is more subtly produced. The tractor or pusher prop also begins to accelerate the air over the top rear section of the ducted fan backwards. This overcomes the tendency of the air to be drawn backwards and down into the rear section of the ducted fan. The tractor or pusher propeller thus increases the rear quadrant lift discussed earlier. This further helps to reduce the pitch up common to earlier ducted fan aircraft.

Amend the description of the second paragraph of page 32 as follows:

The use of a tractor or pusher propeller directly over the rear quadrant of the ducted fan is an improvement over Patent # 6,170,778 B1, which places a pusher propeller at the extreme rear of the aircraft subject of that patent. The vertical plane of the pusher propeller is behind the duct a distance of over 50% of the duct diameter. Duct suction isokinetic profiles of constant velocity are in the shape of slightly flattened hemispheres drawn around the duct inlet perimeter. Suction velocities drop off at the third power of the distance from the cross sectional plane of the duct inlet. The pusher propeller location is so far behind the duct that it can draw only a small fraction of the air into it from the rear quadrant of the duct. The jyrodyne tractor or pusher propeller by comparison, lies directly over the rear lip of the ducted fan, and can draw substantially more of the air over the rear quadrant of the ducted fan. Thus, the location of the tractor or pusher propeller on the jyrodyne will be three to four times as effective contributing to rear quadrant lift as the pusher propeller subject of Patent # 6,170,778.

Amend the description of the first paragraph of page 33 as follows:

Taxi tests utilizing the quick application of full power for either conventional tricycle or taildragger-type landing gear proved to have unacceptable stability in crosswinds or turns. The Harrier-type landing gear with a much larger nosewheel than normal, and a larger tailwheel proved to work, but required significant modification to the two-stage outrigger landing gear placement to prevent the jyrodyne from nosing over to the side during hard acceleration or sharp left and right turns during full power applications to the tractor or pusher propeller. This particular problem developed during initial taxi tests with radio-controlled models, which showed that the placement of the outriggers under the wings as is done in conventional practice would not work. Further tests with the outriggers extended forward of the bottom wing on stalks did prevent the prior problem with noseovers. These stalks are illustrated in **Figure 1,** above the wheels indicated by arrow **105**.

Amend the description of the fourth paragraph of page 34 as follows:

The jyrodyne is suited to conventional amphibious operations, due to the location of the tractor or pusher propeller above and behind the fuselage that is used for conventional flight. Conventional water takeoffs and landings are possible with the proper flotation devices substituted for the landing wheels. Substitution of fixed amphibious floats for the nosegear, outriggers and tailwheel may be performed in the conventional manner, and will allow conventional and STOL takeoffs and landings from water or land.

Amend the description of the fourth paragraph of page 36 as follows:

An alternate drivetrain configuration may be seen by referring to **Figure 19**. A turbine engine, **102,** may be substituted for the pylon mounted tractor or pusher propeller used for forward flight. If used as a turboprop jet engine, it will drive its own propeller, and supply power via a gearbox and interconnecting shafting to the main driveshaft through another gearbox. The conventional flight clutch, **48**, is eliminated, substituted for by a variable pitch propeller mounted on the turboprop jet engine. In VTOL mode as the clutch pedal is depressed, the turboprop jet engine's propeller goes into a flat, low pitched mode, where it produces little thrust and consumes little horsepower. This prop pitch change is effected in the conventional manner utilized on conventional aircraft with constant speed propellers. In conventional flight, the ~~Vtol~~ VTOL clutch, **56**, is disengaged.

Amend the description of the fifth paragraph of page 36 as follows:

A turbofan jet engine may be used instead of the turboprop jet engine as an alternate, with a jet engine configuration used for forward thrust rather than a propeller. VTOL flight is effected using a gearbox and power takeoff shaft from the turbofan jet engine, and directing that to the main driveshaft as described above. Such a configuration has the potential for supersonic flight.

Amend the description of the first paragraph of page 37 as follows:

In the full sized embodiment, once airborne in the VTOL mode, the jyrodyne is tilted forward to develop forward momentum. At a forward speed of 20-30 mph, the power from the engines is smoothly but quickly transferred from the ducted fan rotor in the exbedded ducted fan to a tractor <u>or pusher</u> propeller mounted above the rear of the exbedded ducted fan.

Amend the description of the second paragraph of page 37 as follows:

This is accomplished in 2-5 seconds using two shaft mounted, multi-disc pneumatic clutches, **48** and **56**. One of these clutches controls power transmission to said tractor <u>or pusher</u> propeller used for forward flight; this is called the conventional flight clutch, **48.** The other clutch, called the VTOL clutch, **56**, controls power transmission to the ducted fan rotor, which is part of the exbedded ducted fan.

Amend the description of the last paragraph of page 37 as follows:

The clutch required is a multi-disc, through-shaft clutch mounted inside a toothed and flanged sprocket, called the bottom propeller sprocket. Said sprocket attaches to a reinforced rubber toothed belt to transmit the power to said tractor <u>or pusher</u> propeller mounted above said sprocket. Said propeller is mounted on a separate driveshaft, called the propeller driveshaft, **52**. Said sprocket is thus either engaged or disengaged from the sprocket section of the driveshaft, **58**, which in turn engages or disengages said propeller from the driveshaft. When the conventional flight clutch inside the bottom propeller sprocket is disengaged, the engine power in the driveshaft passes through said sprocket and clutch and supporting members to a bearing, **64** and coupling, **51**, and then to the VTOL clutch, **56**.